

CS 330

Microcomputer Architecture

Winter 2009

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Office Hours: M T W R F 10:00 – 10:50 AM
M W R F 2:00 – 2:50 PM
Other times by Appointment

Text: Digital Electronics: Principles & Applications (7th edition), by Roger Tokheim
Text Website: http://highered.mcgraw-hill.com/sites/0073126349/student_view0/index.html

Electronic versions of this document have working hyperlinks!

This class is an introduction to the hardware and software interaction of microcomputer operation and application. The topics have been selected so that the student will acquire the basic knowledge necessary to pursue, on her/his own, any aspect of hardware or software application later desired.

Basic principles which underlie electronic computer operation, organization and programming will be studied. These include:

- Binary numbers; arithmetic and information coding
- Boolean Algebra
- Digital logic circuits
- Machine and assembly language programming
- Interfacing including hardware and software aspects

Digital electronic circuitry and the accompanying binary arithmetic and digital logic will be introduced. Using digital logic circuits as building blocks complex register circuits and memory devices will be studied. The synchronized operation of combinations of these circuits on a bus structure forming a microcomputer architecture will be developed. The programmed operation of the microcomputer architecture will serve as a model for the study of machine language programming. The courses will conclude with an introduction to interfacing topics.

Grade Breakdown:

Fridays	<u>Quizzes (Lowest 1 Dropped)</u>	30%
Tuesdays	Labs	30%
Wed/Friday, Feb 25 / 27, 2009 12 - 12:50 PM	<u>Midterm Exam</u>	20%
Monday, Apr 27, 2009 12 - 1:50 PM	<u>Final Exam</u>	20%

NOTE: You must receive a passing grade in each part (Lecture and Lab) separately in order to pass the course as a whole. If you fail either part, regardless of your grade in the other part you will fail the course!!

Please be sure any cell phones or pagers or other devices do not produce sounds during lectures.

Please do not engage in conversations at all during lectures and at times when the professor is lecturing during a lab exercise. At times when the professor is not lecturing during a lab exercise, you may have conversations provided they are not offensive or distracting to other members of the class.

Computer Usage Policies:

- **UNLESS PERMISSION is GRANTED, All Laptops and other Electronic Communication/Entertainment devices are to be off and remain unused during class times.**

If Permission is granted then:

- Computers (both room based and laptops) are to be utilized for course work and activities related to course work.
- Writing computer code whether for this class or another CS class while the professor is lecturing is not appropriate.
- Do not use computers for entertainment or communications during class meetings.
- Do not display material on screen which may be distracting or offensive to other members of the class (including the professor).
- Keep a backup of all your files. The university is not liable for any data lost due to equipment failures, damaged disks, or misuse of computer programs.
- Do not utilize software in violation of licensing agreements. Do not copy software, information, data or other work in violation of applicable copyrights. Be aware of current copyright laws regarding software, music, movies, and other digital information. Copyright information may be accessed through the NMU Library website at: <http://www.nmu.edu/olsonlibrary/copyright.htm>
- You may not copy, install or use any service, information, data, image, recording, or other work in violation of applicable copyrights or license agreements. You may not possess any software or resource whose purpose is to effect one of the afore mentioned violations.
- You must take full responsibility for what you publish, transmit, or possess.
- You may not steal, forge, cheat with; snoop on; tamper with; misuse, damage, harass with; hoard or monopolize; interfere with; violate the confidentiality of; or destroy any information, resource, equipment or software. This includes using your personal computer for these activities against other users or against their information resources.

DISABILITY SERVICES

If you have a need for disability-related accommodations or services, please inform the Coordinator of Disability Services in the Disability Services Office by: coming into the office at 2001 C. B. Hedgcock; calling 227-1700; or e-mailing <mailto:disserv@nmu.edu>. Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state, and University guidelines.

- V Registers
 - 1. Buffers, counters and shift registers (**Chapters 9, 8**)
 - 2. Synchronized operation
 - 3. The tri-state concept
 - 4. Examples of registers
 - 5. Memory devices (**Chapter 11**)
 - addressing
 - memory types
 - 6. Laboratory examples of register and memory operations in the computer.

- VI Computer architecture
 - 1. Bus organization
 - 2. Sequential operation of registers
 - 3. Programmed instructions
 - instruction fetch cycle
 - instruction operation cycles

- VII Assembly language programming: basic instruction types
 - 1. Data transfer
 - 2. Addressing modes
 - 3. Laboratory examples
 - 4. Arithmetic and logic operation
 - 5. Review of flags
 - 6. Laboratory examples

- VIII Branching of the program operation sequence
 - 1. Unconditional branching
 - 2. Conditional branching
 - 3. Relative addressing
 - 4. Laboratory examples
 - 5. Subroutines and stack operation
 - 6. Utility program examples
 - 7. Laboratory examples

- IX Interfacing topics
 - 1. Handshaking
 - 2. Parallel data transfer
 - 3. Serial data transfer, the 1650/8250 UART
 - 4. Digital to analog and analog to digital conversion
 - 5. Laboratory examples